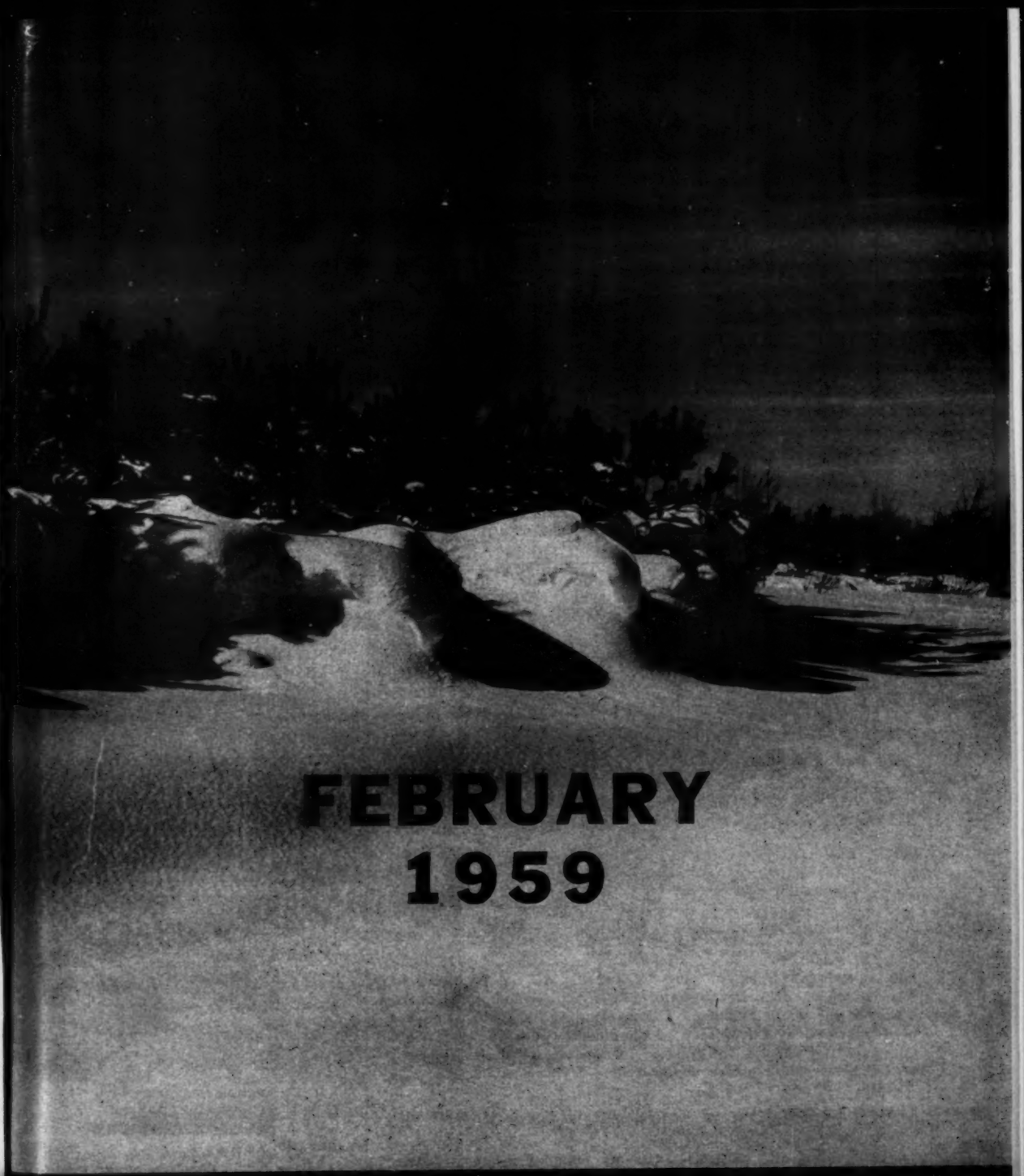

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SECRETARY OF AGRICULTURE

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ADMINISTRATOR, SOIL CONSERVATION SERVICE

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★ THIS MONTH ★

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TOM DALE, Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, June 26, 1958. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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FISHING RODEO.—About 150 youngsters participate each year in an unusual "rodeo" in Wautauga County, N. C. The youngsters spend an entire afternoon trying their luck at fishing in a large farm pond on the Diamond S ranch near Boone.

The pond was constructed in 1950 as a part of the conservation program being carried out in cooperation with the Wautauga County Soil Conservation District. Bream were placed in the pond in the fall of 1950, and bass added the following spring. Proper fertilization and management brought the fish to pan size by the spring of 1952. That is when Bo W. Stallings, the pond owner, began his fishing rodeo.

No charge is made for fishing in the pond. Any boy or girl, age 2 to 10, is permitted to fish on Rodeo Day. The only other persons allowed to fish in the Diamond S pond are local Boy Scouts and occasional Sunday School groups.

Boone merchants donate gifts for lucky fishermen on Rodeo Day. Prizes are awarded to the youngster who catches the first fish, to the most disappointed fisherman, the one who catches the smallest fish, and to the one who catches the largest fish.

The youngsters who fail to catch a fish do not necessarily have a bad time, as Stallings always treats them to refreshments at the end of the rodeo.

Editors are invited to reprint material originating in this magazine.

FRONT COVER.—Snow drifts in the lee of a 12-foot windbreak, Erie County, N. Y.

Photo by G. H. Decker

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Suburban Conservation

A Home Gardener Describes the Soil and Water Conservation Practices Used on His Suburban Lot.

By ARTHUR B. BEAUMONT

MY rectangular lot of 1⅔ acres lies on sloping land. Before conservation practices were installed, there was considerable water erosion of unprotected soil. Now that the entire area is under a complete conservation plan erosion is negligible and soil productivity is greatly improved.

For a number of years I was engaged in educational and administrative work in the field of soil and water conservation. Gardening was my hobby. I recognized that I had an excellent opportunity to "practice what I preached", to demonstrate practices I advocated for suburban or urban conditions, and to do some experimenting in this field. So into suburban conservation, a fairly new field, I plunged with a beginner's enthusiasm. The experience has been rewarding. My story may be helpful to other conservation-minded suburbanites.

At one time I had six garden plots of various dimensions. Three plots were used for growing vegetables and three for flowers. The total area under cultivation was about 11,500 square feet, (slightly more than ¼ acre). Twelve conservation practices have been demonstrated on garden plots and on areas not in gardens. I have proved to my satisfaction that many standard practices commonly used on farms, or modifications of them, can be applied to suburban conditions similar to mine.

On the cultivated plots I have established the following practices: (1) Contour planting, (2) Across-the-slope planting, (3) Terracing, (4) Mulching, (5) Cover cropping, (6) Use of odd-shaped areas, and (7) Drainage.

In addition, outside of the garden plots the following practices have been established: (8) Tree windbreak, (9) Permanent sod cover, (10) Bank protection by vegetal cover, (11) Slope protection by water spreader, and (12) Conservation of organic matter in compost.

Advance planning of conservation practices is important. Although I was not classed as a conservation planner, I nevertheless did my own planning. With elementary knowledge of conservation principles and with some imagination, the average suburbanite or rurbanite can plan most, if not all, of his conservation practices. Necessary information can be gotten from the abundant literature on the subject available from the Federal Extension Service, the local soil conservation district, or the Soil Conservation Service. In many soil conservation districts expert advice on difficult problems can be obtained from technicians of the Soil Conservation Service.

A. B. Beaumont displays the heavy hay mulch he uses in his sweet corn patch.

Note:—The author is a consultant of the Soil Conservation Service Amherst, Mass. Formerly he was State conservationist, Soil Conservation Service for Massachusetts.

The area that required the most planning was a plot about 128 feet by 66 feet in size. The slope of this plot is from about 8 to 11 percent. I decided to divide the plot into approximately equal areas with a miniature terrace. This simplified the problem by making smaller areas to work with. The terrace, built with a hoe, is about 18 inches wide and 6 inches high. It has a grade of .5 percent, which causes it to discharge water onto permanent sod. Asparagus roots were planted in the channel of the terrace. A terrace is rarely necessay on long, narow plots if the longer dimension runs across rather than up and down the slope. Such was the case with a contour flower plot 9 by 76 feet.

The parts of the plot on each side of the terrace, except for an odd-shaped (triangular) area, were planted to row crops on the contour where the slope was regular. And where the suface was so irregular that contour planting was not practicable the plot was planted across the slope. These mechanical practices were supplemented with mulches or cover crops, and the combination gave almost perfect conservation. The triangular area was planted to melons.

Mulching the soil with loose organic matter is one of the most effective conservation practices. Mulches not only reduce erosion to a minimum,

White pine windbreak 18-years old that Beaumont keeps low by topping.

Contour flower bed in the Beaumont garden.

they also conserve soil moisture, check weed growth, improve soil tilth, enhance the intake of water by the soil, and increase soil fertility when they decompose. They are particularly good in a garden because they prevent raindrop-splash erosion, which splashes soil onto vegetables.

My principal mulch is hay, which is made from grass cut on the place. It goes onto the garden at the rate of 8 to 10 tons per acre. Two flower plots are mulched with hardwood leaves. Strawberry plants are mulched with pine needles, and small plots have been mulched with sawdust and lawn clippings.

While mulching is one of the best conservation practices, it may be expensive if mulching material has to be purchased.

The use of cover crops is one of the simplest, easiest, and least expensive conservation practices for a garden. Like mulches, cover crops protect the soil from erosion. They also add organic matter to the soil but usually not as much as do mulches. Cover crops may be sown on bare ground for protection at any time in the growing season, but they are usually sown in late summer or early fall for winter protection.

The small grains are most commonly used for cover crops, and of them winter rye is the most popular. I use oats for winter cover because in my latitude the oats make a good fall growth, but are killed by winter temperatures. Since I neither plow nor spade my garden, I prefer something that will not seriously inter-

fere with spring planting and cultivation. I depend on shallow cultivation with a hand-pushed, wheel cultivator.

My contour-planted flower plot is situated in a place where drainage is sometimes a problem. In periods of heavy rainfall and also in the spring when snows are melting, there is considerable surface runoff and seepage. This excess water has been disposed of by digging a trench on the upper edge of the contour plot. With a slight grade to the trench, the water is drained off and discharged onto sod.

On the west and north sides of my property I planted a pine-tree windbreak. This windbreak not only reduces evaporation of soil moisture and protects growing plants from damage by high winds, it also makes the garden a more comfortable place in which to work in early spring and late fall. The trees, mostly white pine, are frequently topped and pruned to keep them from growing too high and cutting off my view of the distant hills.

A steep bank on one side of my property is protected by means of ground cover vines. For this purpose I have used Pachysandra terminalis and a strain of Euonymous radicans (wintercreeper). These creeping vines require little attention, but of the two the Pachysandra requires the least care. There are many good ground cover plants other than grass that are suitable for soil protection. Some of them, including Pachysandra, are suitable for growing under trees, where it is often difficult to grow grass.

An eaves gutter downspout from the house emptied on a fairly steep slope. The soil was being gullied. The situation was corrected by means of a level water spreader placed in the path of the stream. A creosoted wooden strip about 4 by 30 by ¾ inches was used as a spreader. A carpenter's level was employed to level the strip, which was inserted longitudinally, edge up, into the soil, the top edge being made flush with the soil surface. The effect of the spreader was to spread the water out in a thin sheet instead of letting it concentrate in a narrow stream. This practice has proved effective. Aluminum or other suitable metal strip might be substituted for the wooden strip.

The conservation of organic matter by composting is a part of the conservation program. Into the compost pit go all sorts of garden waste such as cornstalks, overripe lettuce, spent flowers, lawn clippings, treeleaves, and garbage. A little nitrogenous fertilizer, lime, and wood ashes are added to promote decomposition. The aerobic-anaerobic system is followed, whereby numerous shovelings back and forth

Miniature terrace covered with old asparagus tops with newly laid-out contour rows in the Beaumont vegetable garden.

are not needed. The compost is usually applied as a mulch between rows of vegetables or flowers.

Generally, practices which conserve soil and moisture also increase soil productivity. This is to be expected since the loss of soil and nutrients is reduced to a minimum and soil moisture conditions are made more nearly optimum. The general rule applies in this case. The yield and quality of crops have improved. Here are some examples of yields, all on the acre basis: potatoes (early), 800 bushels; onions, 630 bushels; tomatoes, (ripe) 27 tons, (green) 7 tons; sweet corn, 26,700 ears.

The enlargement of the area of pavement of all sorts and of roofs in suburbs has increased the water runoff, and has, thereby, in many cases accentuated the problem of water control and soil losses. Suburban conservation, if widely practiced, could help solve this problem and would be of particular importance where an entire watershed is being treated. Furthermore, conservation on the home grounds may become a most interesting and rewarding hobby for conservation-minded residents. Conservation, like charity, may well begin at home.

Lots Of People At Work

A Soil Conservation District Accomplishes its Objectives by Getting a Lot of People to Work Hard at the Job.

By BERNICE DeSHONG

THE East Woods County Soil Conservation District hasn't built a better mousetrap that the world might beat a path to its door. It has proved, however, that when enough people are interested in putting a thing over the world will hear about it.

This district has operated on the theory that the success of its program depends on informed

Note:—The author is clerk-typist, Soil Conservation Service, Stillwater, Okla.

Representatives of some of the agricultural groups of East Woods County that cooperate with the SCD. (Seated, left to right) Cliff Thurman and Charles Lee, SCD supervisors; E. S. Cordell, SCS technician; and Louis Gatz, farmer. (Standing, left to right) Sherman Scott, ASC office manager; Ronald Meek, Vocational Agriculture instructor; Cecil Kirkland, FFA supervisor; Jimmie Gatz, FFA member; and J. B. Kelsey, Vernon McNally, and C. S. Wyman, SCD supervisors.

leadership and the number of people interested in its success.

Because of this type of operation, the world heard about the East Woods County District on November 22, 1957, when Milton E. Bliss of the National Farm and Home Hour released his radio program on the observance of Farm-City Week. Bliss spent the week of November 18-21 in Woods County for the purpose of making these recordings.

Under the leadership of William G. Lamont and sponsored by the local Kiwanis Club, the 1956 observance of Farm-City Week was so successful that Lamont was asked to make the printed program available to the 300 Kiwanis Clubs of the Texas-Oklahoma district. Later at the International Meeting of Kiwanis Clubs, Lamont made a report on the Farm-City Week activity and copies of the program were distributed to 3,000 Kiwanis Clubs.

In recognition of his services in this activity, Lamont was given the Lay-Conservationist Award at the 1958 annual meeting of the Oklahoma Association of Soil and Water Conservation Districts.

The program for the observance of Farm-City Week in Woods County begins with organized tours. Kicked-off by a breakfast at the Northwestern State College cafeteria, around 75 businessmen, divided into 4 groups to cover the district, are taken to approximately 50

farms. At each stop, the farmer explains some outstanding practice on his farm, and then the farmer joins the group for the remainder of the tour.

On the next day, the farmers are invited into town for a tour of various business enterprises.

On Sunday, the farmers are invited to visit the church of their choice where, in many cases, special services are held.

The Week's observance is climaxed by the Farm-City banquet at which the businessmen act as host to more than 200 farmers. Don Williams, administrator for the Soil Conservation Service, was guest speaker for the banquet in 1957. Jim Devery, local implement dealer, secured Everett Mitchel of the National Broadcasting Company for the 1958 banquet.

The East Woods County SCD is unique in the number of fields in which it has been able to work with other groups and organizations in chalking up outstanding accomplishments.

The idea that "Women Do Things" is being demonstrated in the accomplishments of the East Woods County Ladies Auxiliary. The ladies have furnished conservation kits to 143 classrooms in the schools of the district, and each year have added current material to these kits. They judge approximately 400 posters entered annually in the Soil Conservation Poster Contest. They provide information kits to ministers in the observance of Soil Stewardship Week. They serve on committees, or in any capacity where their services will be helpful to the supervisors of the district. They have been represented at every annual meeting but one of the National Association of Soil Conservation Districts since the local district was organized in 1948.

Conservation Workshop Committee of Northwestern State College. (left to right) Aurice Huguley of Northwestern State College; Cliff Thurman, SCD supervisor; Hugh Green, chairman of the education committee of the State association of SCDs; Tom Hamilton, educational assistant of the State Soil Conservation Board; Leon J. McDonald, assistant State conservationist of SCS; Leo Brandt, head of the agriculture department of Northwestern State College; Crozier Bush, farmer; Charles Lee, SCD supervisor; E. S. Cordell, work unit conservationist of SCS; and Mrs. Cliff Thurman of the Ladies Auxiliary of SCDs.

Charles Lee, chairman of SCD supervisors, presents plaque to Bill Williams, president of Alva FFA chapter.

The accomplishments of Mrs. Cliff Thurman have brought to the local auxiliary both State and national acclaim. We are unable to say for sure whether Supervisor Thurman made a convert of his wife, or if it was due to Mrs. Thurman's enthusiasm for the cause of soil conservation that sparkplugged her husband originally.

However, the ladies auxiliary can point with pride to this farm-wife of the East Woods district who has heralded her story of soil conservation to every corner of the State, and has spoken at two national conventions of soil conservation districts.

In the 2 years that she served as State president of the ladies auxiliary, Mrs. Thurman made the five area meetings each year. She has also spoken at several Oklahoma annual meetings of SCD's as well as meetings in adjoining States. Mrs. Thurman was both a sec-

and and a first place State winner in the annual speech contest staged through soil conservation districts. She holds a high goal before the ladies of her own East Woods County Auxiliary.

The four FFA chapters in the East Woods district—Alva, Capron, Dacoma, and Waynoka —participate annually in the FFA-SCD soil conservation contest. In order to get the contest off to a good start, the Vocational Agriculture teachers are invited to attend the supervisors' meeting in August to make plans for the contest.

A group of local bankers who sponsored awards to conservation farmers in the East Woods County district.

The Alva FFA chapter won both the district and area contests in 1956–57 and 1957–58, and placed 5th in the State. Dacoma was 2d in the district in the 1957-58 contest.

FFA members gathered "benefit" statements from farmers and turned them over to the district to be used in news columns. The Capron FFA chapter placed conservation road signs over the district. All chapters participated in the SCD Land and Range Judging School and Contest. And, conservation movies have been shown to thousands of people.

June 2-20, 1958, marked the beginning of a conservation workshop held in connection with the Northwestern State College at Alva. Dr. Jesse W. Martin, president of the college, says "We are happy to have the privilege of cooperating with East Woods County and other soil conservation districts in offering our first annual workshop in soil conservation."

Charles Lee, alumnus of the college and chairman of the board of supervisors, worked closely with Dr. Martin and agency representatives in initiating the workshop. Lee and his fellow supervisors worked with district governing bodies of the 14 soil conservation districts which constitute the area served by the college in providing scholarships for the workshop.

East Woods County SCD is active in the observance of Soil Stewardship Week. The supervisors act as host to ministers at a breakfast or luncheon, followed by a tour to various farms, pointing out the merits of a soil conservation program on the farm.

East Woods County SCD is extremely fortunate in the type of its leadership. Charles Lee, Mrs. Thurman, and William Lamont have been given recognition for outstanding accomplishments.

The district and the local Kiwanis Club cooperates in recognizing the Farmer-of-the Month. Charles Lee and E. S. Cordell of SCS are co-chairmen of the Agricultural and Soil Conservation Committee that selects the winner.

The Oklahoma Bankers Association, through the local bankers, have made awards to 70 farmers in the district. These awards are presented at annual meetings for which the local bankers furnish the food and the SCD furnishes the program.

The East Woods County SCD points to its report of accomplishments as proof of the merits of its plan of operation. The district is divided into 16 communities with interested, active, and trained leadership. Each community has a job and a goal, but all work together with a common objective.

Twenty-seven thousand acres of former cropland have been reseeded to native grasses, 100,000 acres are being properly grazed, 22,000 acres have brush control, 11,000 acres are contour-farmed. Two-hundred-and-seventy-nine ponds have been constructed, with 120 of them properly stocked with fish, 33 miles of diversions have been built, 430 miles of terraces constructed, 1,943 acres drained, and 152 wells have been dug.

The East Woods County SCD is thoroughly convinced that there is no substitute for working through people—lots of 'em—to accomplish its purpose of soil conservation on the land.

STRIPCROPPING FOR WIND EROSION CONTROL

By W. S. CHEPIL

No. 42

This is the forty-second of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

STRIPCROPPING, wind stripping, or strip farming, as it is variously called in different regions, is used to control wind erosion, especially in crop-fallow sequences in the Northern and Central Great Plains. It is a practice that does not require any change in cropping practices. It merely involves subdividing the farm into alternate strips of erosion-resistant and erosion-susceptible cropping practices. If the cropping practices on the farm are equally resistant or susceptible to wind erosion, there is no need for stripcropping.

Stripcropping is especially adaptable in dry regions where fallowing is done every second or third year. In the northern dry regions the summer-fallowed land is not seeded until the following spring. Thus, it is left bare during the windy season except for what crop residue may remain on the surface from a crop grown almost 2 years previously. To protect it from wind erosion, strips of standing stubble alternating with strips of fallow are virtually imperative on many soils. In the southern dry regions the problem is less acute because wheat on fallow is sown in the fall and if germination and growth conditions are favorable, a good protective cover against next spring's winds is usually obtained.

Note:—The author is a soil scientist, soil and water conservation division, Agricultural Research Service, Manhattan, Kans.

The purpose of stripcropping for wind erosion control is to provide barriers or trap-strips to check the spread of soil movement if and when it starts. The most common barrier strips are standing wheat or sorghum stubble. The stubble should not be disturbed by tillage or pasturing until the danger of blowing is over. Wheat stubble is generally more effective than sorghum stubble, and standing stubble more effective than flattened stubble for trapping blown soil. The stubble should be left as thick and as tall as possible.

How effective is stripcropping for wind erosion control? The answer to this question hinges largely on how effective the system is in preventing the rate of soil movement from exceeding a certain tolerable limit. Measurements of with different soils and under different wind velocities and directions show that soil blowing is zero at the windward edge of a field or strip and increases with distance downwind until it reaches a maximum. The maximum rate of flow is remarkably uniform for all soils. For a 40-m.p.h. wind velocity, it is equal to about 2 tons per rod width per hour.

The more erodible the soil, the greater is the

A strip rotation of wheat, fallow, and sorghum on a highly erodible sandy soil. Strips are 20 feet wide.

rate of increase in soil flow along the direction of wind and the shorter the distance in which the possible maximum soil flow is reached. Soil erodibility and therefore the rate of increase in soil flow are influencd greatly by soil textural class. The intermediate-textured soils, such as loams, are generally least erodible and the rate of increase in soil flow is more gradual than on sandy soils or some clays. Therefore, to be equally effective, strips on sandy soils and on some clays have to be narrower than on intermediate-textured soils. Based on average results, widths of erosion-susceptible strips necessary to keep the rate of soil flow from exceeding .2 ton per rod width per hour should be as follows:

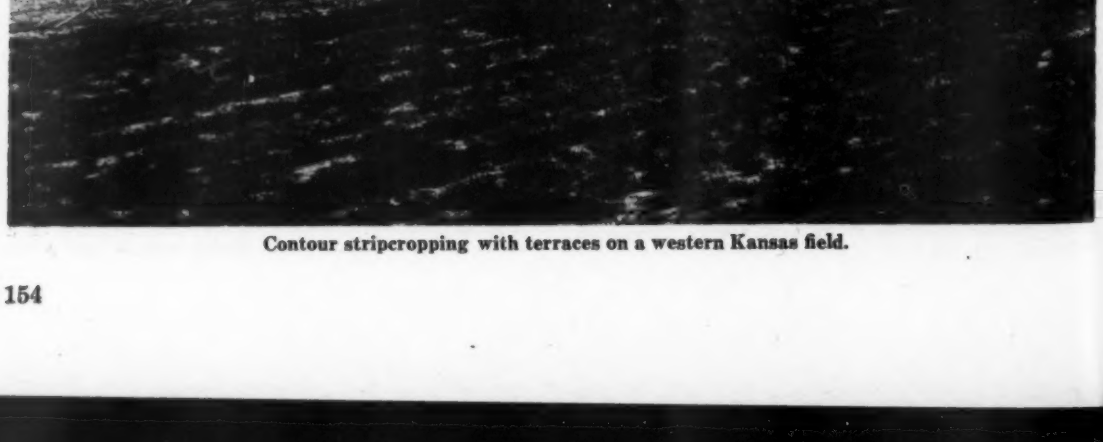
Soil class	Width of strips
Sand	1.2 rods
Loamy sand	1.6 "
Sandy loam	6 "
Loam	15 "
Silt loam	17 "
Clay loam	21 "
Silty clay loam	26 "
Silty clay	9 "
Clay (subject to granulation)	5 "

The above widths are applicable for strips protected by 1-foot high stubble on the windward side and running at right angles to the wind of a velocity of 40 miles per hour. The widths should be adjusted one way or the other to fit the width of tillage machinery and to divide equally into the whole area to be stripped.

The actual width of strips required is influenced by several major factors. Apart from soil textural class, the general level of wind velocity plays a major part. The higher the likely wind velocity, the narrower the strips should be for equal effectiveness. Also, the effectiveness of the strips decreases as the wind deviates from right angles to the strips.

Still another factor is the width of the barrier strips and the height and thickness of stubble or other plant material in the barrier strips. The primary purpose of the barrier strips is to trap the soil that blows off the erosion-susceptible strips. There is some sheltering afforded by the barrier strips, but measurements have shown that for all but the most erodible soils the distance sheltered by standing stubble is small compared to the distance required for soil flow to reach the maximum rate.

For example, complete protection afforded by 1-foot high wheat stubble extends from 5 to 20 feet along the direction of the wind; but, the distance required for soil flow to reach a maximum rate ranges from about 100 to 10,000 feet, depending on wind velocity and soil erodibility. In other words, the increase in soil flow is not



Contour stripcropping with terraces on a western Kansas field.

Aerial view of the Arneberg dairy farm showing the 5-acre irrigation pond in right middle-distance.

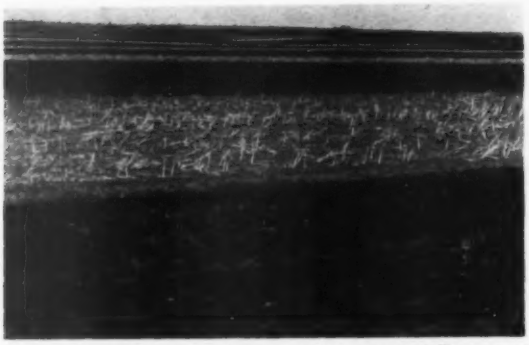
primarily due to reduction in sheltering afforded by the barrier strips. It is due mainly to a phenomenon known as soil avalanching, which is much like snow gathering volume and momentum as it rolls down a mountain.

The barrier strips need to be only wide and receptive enough to trap all the soil, except fine dust, that moves into them. For standing wheat stubble, a 30- to 50-foot width is usually sufficient. However, the erosion-resistant strips are usually rotated each year with erosion-susceptible strips so that both are normally made equal in width. The width of erosion-resistant strips in such cases is usually far greater than that required to trap all soil that may be moved into them.

The width of strips depends, too, on the rate of soil movement that may be considered tolerable. This in turn, depends on how much reduction in erosion is desired. The greater the desired reduction, the narrower the strips should be. The rate of .2 ton per rod width per hour may be considered tolerable. It is not a negligible rate. It is the rate that should occur on the leeward side of strips under a 40-m.p.h. wind velocity without supplementary practices of erosion control. Supplementary practices that maintain crop residues above the surface of the ground and increase surface roughness and soil cloddiness would normally reduce erosion to a negligible rate. If, in unusually dry years, crops fail and insufficient crop residues, surface roughness, and soil cloddiness are available for needed protection, the maximum rate of erosion in a stripcropping system should be only .2 ton per rod width per hour—about one-tenth of the possible maximum rate of soil erosion.

The tolerable rate of soil flow is associated with the degree of risk the farmer is willing to take. He has to accept the width of strips that would fail occasionally because the width that would reduce erosion to a negligible degree without the presence of sufficient amounts of crop residue, surface roughness, and soil cloddiness would be too narrow to be practical for most soils.

Space is too limited in an article of this type to indicate the intricate relationships between suitable width of strips required for different conditions. Formulas indicating suitable width of strips for virtually any soil class, height of wind barrier in the erosion resistant strips, wind velocity and direction, and tolerable rate of erosion likely to occur on erosion-susceptible strips are given in the Kansas Agricultural Experiment Station Technical Bulletin 92, 1957.



A strip rotation of wheat, sorghum, and fallow on a sandy loam soil, with strips about 75 feet wide.

Stripcropping at best may reduce the intensity of wind erosion, but not stop it. Alone it has never been sufficient, but merely an aid, in reducing erosion, and especially in preventing soil blowing from spreading to other farms and communities.

Some special precautions must be taken in stripcropping systems. The tendency of soil to ridge on the windward edge of the stubble strips is one objectionable feature. To overcome this tendency the edges of the stubble strips may be disked so the blown soil would be spread over the stubble instead of ridging on the edge. Under extremely erosive conditions, strips may be shifted slightly to one side each year.

Another problem may be weeds growing on the edges of strips. These can be controlled by seeding grain 2 or 3 feet over into the next strip. As the next strip is cultivated later in the season, the cultivator can be extended into the seeded strip, thus killing the weeds that may grow along the edge.

Still another difficulty of stripcropping has been grasshopper and other insect infestations along the edges of wheat adjoining the sorghum or wheat stubble strips. With the advent of modern insecticides and modern spraying techniques, this problem usually can be overcome readily. Information on the use of modern insecticides can be obtained from various entomological institutions.

Some inconveniences of stripcropping are time lost in moving equipment from one strip to another, roads required along headlands to work strips, impossibility of cross-cultivation, and inconvenience of pasturing sorghum strips in the fall and the alternating wheat strips in the spring. Where extremely large tillage and planting equipment is used, farmers seldom like to practice stripcropping; but, with ordinary equipment there is little complaint.

Under severe conditions of wind erosion many farmers who have adopted the system are convinced that the advantages of stripcropping far outweigh the disadvantages, provided, of course, supplementary practices that must go with stripcropping are adopted too.

More Lamb Chops From Fewer Sheep

A Rancher Reduces His Herd of Ewes and Improves the Range, and Produces More Marketable Mutton With Greater Profit.

By DONALD H. FULTON

"SHEEP ranching was beginning to get pretty tough in the Uintah Basin in the early 1940's recalls Walter T. Smith, a prominent rancher near Fruitland, Utah. "The grass was gone in our lambing pastures, and I was getting a poor lamb crop. I decided that if I was going to stay in the ranching business, I would have to do something to get better production. So I started to do something and the resluts are encouraging. For example, in 1942, I sold 216,000 pounds of lamb from 4,500 breeding ewes. In 1957, through improved range management, I sold 236,000 pounds of lamb from 2,300 ewes.

"I can remember when there was hardly enough feed over in Section 24 for the deer that came there. I would turn the sheep in there in the spring and could not get enough herders to hold them. The chief forage was sagebrush, and the sheep were looking for green grass. Last spring, I had 600 ewes, 60 bucks, and 12 horses in that area for 35 days, and they took only 25 percent of the grass," he stated.

In 1946, Walt was running 4,500 head of sheep on his spring-fall range, and there was hardly enough forage to keep them alive. Two years later he cut his herd to 2,300 head and began a range improvement program. With the assistance from SCS technicians cooperating

Note:—The author is range conservationist, Soil Conservation Service, Roosevelt, Utah.

with the Uintah Basin Soil Conservation District, a range survey was made, and Smith developed a range management plan. The main problem area was on his Tabby Mountain-Golden Stairs Range near Tabiona. This 28,000 acre range was used for lambing and grazing before the sheep went to the summer range.

"Even though I cut my herd in half," Walt said, "I knew that the lower dry range would be slow coming back unless I helped it along."

Smith burned off some of the big sagebrush flats and pinion-juniper ridges, and drilled crested wheatgrass. In this 10- to 12-inch precipitation zone, good stands of grass were established.

"When I first began to drill the grass, I was planting at the rate of 8 pounds to the acre, but I have found that I can get as good a stand with 5 pounds per acre." ,

Since 1950, Walt has cleared and seeded over 1,500 acres of range, which provides early spring grazing for lambing ewes.

In 1953, he tried to burn an area, which was covered with big sagebrush 8 feet tall, but there was not enough understory grass to carry a fire. Smith had this area dragged with heavy railroad rails, which broke the old brittle brush at the ground. Crested wheatgrass was broadcast in front of the railing. Although only a fair stand was established, there is now a good stand of native forage such as white sage, western wheatgrass and Indian ricegrass. Since then he has railed and seeded more than 600 acres with good results.

"I know I could get a better stand of crested wheatgrass if I disked and drilled the seed, but most of my range has white sage, and I want to encourage it to grow along with crested wheatgrass," he said.

"Herding used to be a problem during lambing time, but now, with about 20 miles of fence and 5 pastures, there is no problem. The sheep are contented and take good care of their lambs. I distribute the ewes into the pastures about May 5, and never bother them until June 10, when we dock the lambs and put them on higher range."

There are several stock watering ponds on the Golden Stairs Range, but Smith found they were not very dependable.

"I have found that hauling water to sheep on spring range has a lot of advantages," he says. "I can get good distribution of grazing in all the pastures by putting the water troughs in areas the sheep are not getting to. I can actually defer grazing in parts of a pasture by rotating my water throughs. There is not much added expense to this operation. My herders don't have to spend much time herding, so they haul water."

Upland range site on the Smith ranch that was covered only with big sagebrush a few years ago. Railing killed most of the sagebrush and permitted forage grasses to cover most of the area.

Walter T. Smith stands in a field of crested wheatgrass that was growing nothing but sagebrush and juniper a few years earlier.

The range survey, made in 1948 by Soil Conservation Service technicians and Walt, showed that 15,000 acres of the range were in poor condition, and 13,000 acres (mostly the higher elevation range) were in fair condition. A recent check shows that only 4,000 acres now are in poor condition, 18,000 acres are in fair condition, and 6,000 acres are in good condition. These figures are more impressive when converted to usable forage.

In 1948, the lower range in poor condition produced only 40 pounds of usable forage per acre when clipped. The reseeded areas on the same range site now clip 400 pounds of usable forage per acre. This indicates an improvement of 1,000 percent. The usable forage on the native range has increased three to four times. The seeded areas have helped to take the grazing load from the native range.

Better forage species are increasing and growing where none were seen 10 years ago. Smith's brother, Tony, recently made a tour of the range for the first time in 10 years and commented that he did not know before that Indian ricegrass grew on the ranch. Species such as slender wheatgrass, bluebunch wheatgrass, and Indian ricegrass are growing out from under the sagebrush and filling in the open places. Great Basin wildrye and western wheatgrass are beginning to grow in the bottoms of old gullies, which helps to prevent further soil loss.

"A ranching operation has to be different now than it was a few years ago," says Smith. "Expenses were low in the thirties—got some free range—I could get by with a 60 percent lamb crop. Now with high operating expenses, I need a 100 percent lamb crop to stay in business. Now that I'm getting the range built up and have made some changes in my management, I'm doing all right.

"Before I started my range improvement program, the ewes used to shear 8½ to 9 pounds of wool each. Now they average 11 pounds. The lamb crop has increased at least 25 percent. We are now selling heavier lambs. A few years ago, an 80-pound lamb was a good one. Now they will average 85 pounds. Last year was a good year, and they averaged 91 pounds.

"I still have a lot to do to bring the range up to top condition, but it has come a long way in the last 10 years through following improved pasture management practices. I intend to keep seeding some land every year, improving my herd, and improving the range," Smith concluded.

New Wheatgrasses In Utah

By R. DEANE HARRISON

RANCHERS in Utah are desirous of finding new grasses that will improve management on their reseeded areas. Some ranchers are searching for grasses that will fit in with their present native forage. Others are seeking grasses that are drought resistant and will extend the grazing period. Three relatively new wheatgrasses give high promise of filling these needs.

Ernest Herbert of Salina, Utah, for several years felt the need of improved grass species. He has one of the oldest crested wheatgrass plantings near Salina. Since his first plantings

Note:—The author is range conservationist, Soil Conservation Service, Richfield, Utah.

of crested wheatgrass he has seeded several different grass species.

In May 1957, under the direction of Albert Starr of the Soil Conservation Service he planted Pubescent, Siberian, and Whitmar wheatgrasses in different fields. Later, he planted crested wheat nearby to obtain a comparison. All these plantings were successful. Mr. Herbert bases his success on having a firm seedbed, good viable seed, and good growing conditions. Although these seedings were made in May and were successful, he feels that the best time for seeding grass is in the fall, "The same time of year that Mother Nature seeds," is how he puts it. The grass was seeded in rows of different spacing. This was accomplished by plugging different holes in the grain drill. It appears that 14-inch or wider row spacing is best in this low rainfall area of around 12 inches.

These plantings made by Mr. Herbert help substantiate the findings previously made by SCS plant materials centers at Pullman, Wash. and Aberdeen, Idaho, that these specific grasses have considerable possibilities for this section if used according to their capabilities.

Pubescent wheatgrass, which is relatively drought resistant, may play an important role in summer grazing. It looks like intermediate depth of 2 to 3 feet. In some of the heavier wheatgrass, but, as the name implies, it has hairy leaves and seed heads. It is a vigorous sod former. It should be used mainly for range reseeding and should be seeded alone or with Ladak alfalfa. Seeding alfalfa with all grass

Herbert kneeling in a field of Whitmar wheatgrass on his ranch.

Ernest Herbert standing in a field of pubescent wheatgrass on his ranch.

seedings will stimulate grass growth and increase production, lengthen grazing season, and probably increase protein content of the feed.

Whitmar wheatgrass is a native grass and fits in well with bluebunch wheatgrass ranges. It will out-produce crested wheatgrass and is as drought tolerant. However, it takes longer to become fully established. The forage is palatable to all classes of livestock. It cures well after maturity and makes good standing hay for winter use. Whitmar wheatgrass remains green about 14 days longer than crested wheatgrass, thus extending the grazing season.

Siberian wheatgrass is similar to crested wheatgrass, but the leaves and stems are finer. It is more drought tolerant than crested wheatgrass and will stay green about 10 days longer. At the Squaw Butte Experiment Station in Oregon, Siberian consistently out-produced crested wheatgrass for 15 years.

LOOKING AHEAD I can visualize thousands of our small watersheds in the condition that God intended them to be: hillsides guarded with a mantle of trees and grass . . . land on the lower slopes and in the valleys protected by other conservation practices that save soil and hold back water . . . upstream dams, supplementing land treatment, to hold back water when we have too much, and release it when we have too little . . . land in watersheds revitalized; water more plentiful . . . Man and nature in harmony.

EZRA TAFT BENSON
Secretary of Agriculture

Conservation Education in Colorado

By DON KNIGHT

A Cooperative program in conservation education was started in Colorado in February 1956 with the hiring of a conservation consultant by the State Department of Education. Funds for salary plus some incidental expenses were provided by the State Game and Fish Commission. Travel and office expenses and secretarial help were provided by the Department of Education.

The objectives of this program, as set up, were: (1) Stimulate conservation education at all levels in the schools of Colorado; (2) Assist in the coordination and the development of cooperative programs in conservation education by other agencies; (3) Prepare, collect, and disseminate teaching guides and materials; (4) Encourage research and instruction for teachers through workshops, conferences, and specialized courses; (5) Acquaint school boards and school administrators with the program so that interested teachers may have support for their efforts; (6) Carry on research to determine needs and techniques; and (7) Carry on an information program to keep the general public informed about conservation education.

An initial survey indicated that although much conservation was being taught in some areas of Colorado there was need for a more comprehensive program in most schools. Also, there was need for better materials and more teachers with sufficient background in conservation to integrate it at whatever grade level

Note:—The author was conservation consultant to the Colorado State Department of Education for 2 years. Recently, he has returned to his regular job as instructor in the Denver Public Schools.

Don Knight (right) discusses a display of conservation education materials with teachers attending the Colorado Education Association Conference.

or subject field they were teaching.

Workshops for teachers and administrators were set up in several counties so that educators and conservationists could discuss conservation problems of those areas. Personnel from the Soil Conservation Service, Forest Service, and State Game and Fish Department participated in these workshops. These specialists discussed resource problems dealing directly with the locality in which the teachers were employed. Additional people from the State Department of Education worked with groups of teachers in helping them plan ways of integrating conservation into their present school program.

Conservation materials of all types were assembled and evaluated so they could be recommended for appropriate school use. These materials included texts and supplementary reading materials produced by commercial publishers; State and Federal agency material; and materials produced by private organizations and industries. In addition, free materials from various sources were assembled into packets for various grade levels so they could be used to best advantage by the teachers who received them. These include the most appropriate materials at each grade level from the Soil Conservation Service, Forest Service, and State agencies. About 2,500 of these packets have been distributed to date.

An audio-visual catalog of conservation materials was prepared. This gives pertinent information, such as description, grade level for which best suited, and source of availability. Also, in process is a guide for teachers, which lists desirable attitudes, understandings, and concepts of conservation and suggests school activities that would be instrumental in bringing about these attitudes, understandings, and concepts.

Teacher training in conservation has been given constant attention. In addition to workshops and in-service programs in the schools themselves the conservation consultant worked directly with the teacher training institutions of the State that offer courses and workshops in conservation for teachers. Here again extensive use was made of personnel from State and Federal agencies.

Bulletins are sent out each year giving essential information on all college courses in conservation available for teachers in Colorado. Consultant service has been provided the institutions in an effort to make such courses more attractive and functional. Through contact with various civic groups, scholarships have been made available for teachers taking such courses or workshops. As a further means of stimulating interest in conservation, exhibits were set up at various education conferences and parent conferences throughout the State.

Teachers attending a country workshop are shown a concrete-lined irrigation ditch near Rocky Ford, Colo.

Another area that has received appropriate attention is that of outdoor education or school camping. This program, which has been developed extensively in many States, has had considerable recent interest in Colorado. In the spring of 1957, a 3-day workshop in outdoor education was conducted. This program, directed by the conservation consultant, enabled many teachers and administrators to explore the possibilities and implications of outdoor education as part of the school program.

At the 1958 annual conference of the American Association for Conservation Information, Colorado received the second place award for its outstanding conservation education program.

LESS BROMEGRASS AND CRESTED WHEATGRASS SEED.—The 1958 crop of smooth bromegrass seed is estimated to be 69 percent less than the record crop of 1957 and 7 percent less than the 1947–56 average. The crested wheatgrass seed crop is the smallest in 4 years. It is about 20 percent of the 1957 crop and about 60 percent of the 1947–56 average.

Progress In 1958

By DONALD A. WILLIAMS

LOOK at soil and water conservation accomplishments any way you wish and the United States can be proud of its accomplishments. Look first at some of the physical measures and cold statistics:

More than 116,000 farmers and ranchers starting to cooperate with soil conservation districts . . .

A total of 1,794,411 cooperators in 2,791 districts. . . .

Soil surveys on 41 million acres last year with an additional 12 million acres of range surveys. . . .

Basic soil- and water-conservation plans on 345 million acres—1,218,433 farms and ranches.

One-hundred small watersheds with approved work plans, ready to start or already started on operations under Public Law 556. . . .

A total of 364 watersheds in 46 States and 1 Territory developing work plans. . . .

Farmers and ranchers signing the first contracts under the Great Plains Conservation Program. . . .

Improved systems of stubble mulch farming on 3 million acres. . . .

Improvements in use of windbreaks for erosion control and of wildlife areas on farms, continued development of cultural methods and use of grasses and legumes, more workable terrace systems, continued improvement of water control structures, use of soil survey information for land capability classifications including range sites and to determine the suitability of land for trees. . . .

The above are just part of the accomplishments that can be measured or observed across the country. Farmers and ranchers have written most of them on the land, with technical help from the Soil Conservation Service obtained through soil conservation districts, and with the help also of many other public and private agencies.

But even more important are some less tangible, but equally real, developments in the minds of men and in the public consciousness. One of these is a change in attitude.

Soil and water conservation today is a widely accepted part of modern farming. The public is becoming more interested and is beginning to accept its share of responsibility. From the grade schoolchild to the seasoned rancher and farmer, people believe that modern soil and water conservation is good. They believe it is necessary to maintain our basic resources for the common good—whether it be production of food and raw materials, watershed protection and flood prevention, preservation of wildlife, recreational facilities and water supplies, or a combination of these and other benefits. Soil and water conservation actually is becoming a matter of public welfare and mutual concern.

Like all worthwhile developments in thought and action, this change did not just happen. It came through teamwork among private and public agencies. It came because of the new technologies and more effective combinations of techniques developed over the years by the Soil Conservation Service and agricultural research agencies. It came because of the development of locally organized and administered soil conservation districts and the hard work and clear thinking of men on district governing bodies. It came because of the intelligent understanding and application of newer soil- and water-conservation methods by the men who work the land.

Helping or encouraging the farmers, ranchers, and landowners in various ways are a host of other organizations and agencies. Without the help of all of them, the Nation's soil- and water-conservation program would not be where it is today. Conservation is truly a "team job."

At the national level the Soil Conservation Service works closely with the Agricultural Conservation Program Service, the Federal Extension Service, the Agricultural Research Service, the Forest Service, the Commodity Stabilization Service, the Farmers Home Administration and other agencies in the Department of Agri-

Note:—This article is a digest of a report for the fiscal year 1958 submitted to the Secretary of Agriculture by Donald A. Williams, Administrator of the Soil Conservation Service.

culture. It also maintains close working relations with the Bureau of Reclamation and the Bureau of Land Management of the Department of the Interior, with the Corps of Engineers of the Department of the Army, and with other Federal agencies. Many non-governmental groups participate actively in the National soil- and water-conservation program.

At regional and State levels, the State soil conservation committees, State departments of agriculture, State conservation departments, the land grant colleges, and regional river basin organizations are just a few of the agencies concerned.

Locally, soil conservation districts, SCS, county ASC committees, small watershed associations, county extension agents, county governments, departments of vocational agriculture, and other local agencies work together.

One of the significant features of the soil and water conservation program noted during the year is the increasing emphasis on planned conservation—conservation projects based on definite and specific plans. When we speak of conservation plans, we no longer think only of farm and ranch plans, although they remain the "hard core" or base of the entire program. Most soil conservation districts have always had plans for their conservation operations. But we now have hundreds of small watersheds with specific plans either completed or in the process of completion. County ASC committees and other local organizations with which SCS works are doing a more exacting job of planning. State and regional organizations also are developing specific plans.

Interest in water conservation continues to grow. More and more concern about proper use, management, and conservation of water was noted in many localities. This was due partly to increased competition for water—water for crops, for domestic and industrial use, for recreation. The continual menace of floods helped point up the need for better water control. But fully as significant has been the recent realization that our water resources, though ample for present needs, are limited, and that better dispersion and use must soon become a reality.

The creation of the numerous watershed associations throughout the country and the recent enactment of legislation by most States on water control and water rights attest the fact that water conservation is becoming of more and more importance. Yet, most of the water conservation protagonists recognize that water conservation cannot be separated from soil conservation. Hence, most water conservation projects are tied directly to soil conservation programs.

State and local governments continue to provide increasing financial and material aid to soil conservation districts and watershed associations. Now we find that State and local contributions amount to about one-third that of the Federal contribution. And the local and State contributions are continuing to grow.

Perhaps one of the most significant developments is the growing realization that rural problems are no longer necessarily agricultural problems. Much land that needs conservation treatment is not farm or ranch land. The intermingling in rural areas of farm and non-farm residents and agricultural and non-agricultural enterprises is creating new kinds of conservation problems.

As extensive rural acreages are taken over by housing developments, factories, airports, highways, defense installations, and recreation centers, a complexity of problems relating to soil stabilization, sedimentation, drainage, sewage disposal, water pollution, tax adjustment, and competition for water supplies arise. All of these problems must be dealt with as a part of the total conservation job.

The urban sprawl, new highways and airports, and other non-agricultural uses of land increase. Unfortunately, these non-agricultural uses often take the more level and better farm lands. As the Nation's population continues to increase this problem will become more acute. We are beginning to realize that conservation planning is no longer just a matter of checking soil erosion and improving soil productivity. Better planning for non-agricultural uses of land is becoming an urgent problem.

The total conservation job is increasing rather than diminishing in scope as our modern civilization develops. Nearly all conservation problems become more complex as population growth and modern technology bring about more intensive and specialized uses of the land. The conservation job ahead seems greater than the conservation accomplishments of the past 25 years.

Soil Conservation Districts

Farmers and ranchers organized 36 new soil conservation districts. This brought the total number of districts to 2,806 in the United States, its Territories, and Possessions. These districts have a combined acreage of more than 1.6 billion acres, of which about 1.2 billion acres are agricultural land. The Department of Agriculture and Soil Conservation Service were cooperating, under memorandums of understanding, with 2,791 districts at the end of the year.

During the year, 116,303 farmers and ranchers, operating about 37 million acres, became cooperators with their local districts. This made a total of 1,794,411 district cooperators operating about 540 million acres.

Soil Surveys

The amount of soil mapping increased substantially over previous years. Altogether, about 41 million acres of soil surveys were completed. This includes 29,331,-431 acres of standard soil survey mapping and 11,762,-895 acres of soil conservation survey mapping. In addition, 12,850,038 acres of range surveys suitable for ranch planning were made.

Working relationships were continued with the Bureau of Public Roads in the cooperative program for obtaining soils engineering data. In counties where soil surveys are in progress, the Service collected samples from major soils series and sent them to the Bureau of Public Roads for tests of physical properties that are important to engineers. Soils engineering data from 49 counties in 24 States were reproduced and distributed.

Thirty-five soil survey reports with accompanying map materials were sent to the Government Printing Office during the year. Sixteen reports were published.

An outline for the preparation of woodland sections in soil survey reports, including methods for grouping soils for woodland interpretations, was completed. For areas where woodland production is important, future soil survey reports will include soil-woodland interpretations.

The first soil survey reports in a new and more attractive format came out last year. Improvement of subject matter presentation continued.

An addition to the soil survey laboratory was completed at Riverside, Calif., nearly doubling the working space there. A building was started at Beltsville, using Atomic Energy Commission funds, to furnish facilities for determinations of radioactive elements in soils.

Samples of soils, vegetation, milk, and bone continue to be collected in many parts of the United States, and in less detail on a world-wide basis to check fallout distribution of radioactive strontium. Wide variations exist between soils, and studies are continuing to relate the fallout to climatic factors and latitude.

Efforts of recent years to improve and partially revise the nationwide system of soil classification were continued. This work reached the stage of a "6th Approximation", copies of which were distributed and reviewed by a number of soil scientists. Although further revision in certain details will continue, it is expected that this classification system will be completed and published by 1960.

During the year cartographic work was accelerated, especially in watershed and flood prevention work. Substantial improvements were made in soil map publication to produce maps that are more legible and easier to understand. The Service produced 305,165 prints of soil and land capability maps for 129,403 farms and ranches. In addition, 411,451 prints of conservation plan base maps were produced for 156,832 farms and ranches.

Farm And Ranch Planning

Basic plans were developed on 91,335 farms and ranches, covering more than 27 million acres, during the year. Revisions of basic plans were made on 13,370 farms and ranches covering about 6 million acres. Altogether, 1,218,433 farms and ranches in soil conservation districts now have basic conservation plans for about 345 million acres.

Special emphasis was placed on improvement of the economic phases of conservation plans. Many States developed cost-benefit guides for all common conservation practices used. Several States held farm and ranch planning workshops for SCS employees where the economic aspects of conservation planning were stressed.

Service personnel gave technical assistance in planning, laying out, and checking group conservation jobs. More than 4,400,000 acres were benefited through these group projects. These figures do not include watershed activities on established watershed projects.

Watershed Planning

Applications for planning assistance were received from 175 small watersheds. At the end of the year 46 States and one Territory had submitted a total of 887 applications for watershed planning assistance under provisions of Public Law 556, "The Watershed Protection and Flood Prevention Act" of 1954.

During the year 96 applications were approved for work plan development. This made a total of 364 watersheds in 46 States and 1 Territory approved for planning. At the end of the year, planning had been suspended or terminated in an accumulated total of 51 watersheds. These suspensions or terminations were at the request of the local sponsoring organizations or with their concurrence.

Fully staffed watershed planning parties were operating in 42 States and planning personnel had been assigned to other States, in line with the work load. The Forest Service continued to assign personnel to work with watershed planning parties where the problems required such assistance.

State agencies in 5 States provided $450,000 worth of additional planning assistance through trust funds, reimbursement, and State controlled planning parties.

Fifty-eight small watershed projects were approved for operation. This brought the total projects approved for operation to 100. Another 26 work plans were com-

pleted and in the review and approval stage at the close of the year.

Work plans were developed for 8 subwatersheds and 1 area of a subwatershed in the 11 large watersheds authorized by the flood prevention act of 1944. This makes a total of 158 subwatersheds plus 1 area, covering more than 14 million acres, that have complete work plans. Planning and operations are proceeding in these watersheds as rapidly as local interests fulfill their obligations in this cooperative effort.

River Basin Planning

With assistance of other agencies, comments were developed for the Department of Agriculture on 18 proposed reports of the Corps of Engineers, 6 proposed reports of the Bureau of Reclamation, and on 1 report of the Public Health Service.

Service personnel represented the Department on the Arkansas-White-Red Rivers, Columbia River, Missouri River, and Pacific-Southwest Inter-Agency Committees and on the Northeastern Resources Committee concerned with river basin planning.

Personnel of the Service, along with those of the Forest Service and Agricultural Research Service, represented the Department in helping the Corps of Engineers revew reports and evaluate land treatment practices for flood control on the Delaware River, Potomac River, and Lower Mississippi River basins.

Service personnel represented the Department of Agriculture in its cooperative work with the Board of Water Commissioners of the State of Mississippi and the Kansas Water Resources Board on studies of the Yazoo and Kansas River Basins, SCS, FS, and ARS personnel worked with the land grant colleges of affected States and the Department of Interior in a study of the Colorado River Storage Project.

Planning Assistance to States

Service personnel served as technical advisors to various State agencies, when requested. Such assistance was given to many States, particularly on water rights and water conservation matters.

Many of the States passed legislation during the year that should materially aid in advancing the Department's small watershed protection programs and help simplify some of the water problems in various sections. During the past 3 years, 38 States have passed 80 pieces of legislation directed toward soil and water conservation. In most instances these State laws have broadened the authority of existing soil and water conservation districts or have provided for the creation of other local organizations to deal specifically with water problems.

Land Treatment

Progress in land treatment is not necessarily measured by the extent to which individual conservation practices are used. A true conservation program must be based on the use of all land within its capabilities and treatment of each tract according to its needs for protection and improvement. Nevertheless, conservation farming or ranching is done mainly by land-use adjustments and by applying individual conservation practices or combinations of practices according to the need. Hence, progress may be determined by measuring the amounts of certain important conservation practices that have been applied to the land.

The following table summarizes the application of some of the most commonly used conservation practices for the Nation as a whole.

Conservation practices newly applied in soil conservation districts, with SCS assistance, 1958.

Contour farming	acres	2,296,854
Conservation crop rotation	acres	7,026,461
Cover cropping	acres	4,144,611
Stripcropping	acres	768,881
Stubble mulching	acres	3,180,221
Terracing	miles	40,986
Waterway development	acres	61,866
Pasture planting	acres	2,983,566
Range seeding	acres	1,295,432
Tree planting	acres	752,113
Windbreak planting	miles	2,383
Wildlife area improvement	acres	488,568
Improved drainage	acres	1,442,564
Irrigation land leveling	acres	460,066
Improved water application	acres	1,290,598
Pond construction	number	63,060

Flood Prevention Structures

Good progress was made in installing structural works of improvement on the 11 watersheds authorized for flood prevention in 1944. During the year 146 floodwater retarding structures were designed, while 131 such structures were completed. This makes a total of 582 of these flood detention structures installed to date with a floodwater capacity of 367,212 acre-feet.

Altogether, 989 stabilizing and sediment control structures were completed this year, making a total of 7,498 such structures now installed on the 11 watersheds. Channel stabilization and improvement was completed on 113 miles, bringing the total to 1,224 miles. Levees and dikes were completed on 1.2 miles bringing the total to 31 miles that required 469,658 cubic years of earth fill. Roadside erosion control work was done on 195 miles, while 36,468 acres of critically eroding land in the 11 authorized watersheds were revegetated with grass, legumes, or woody plants.

Fifty-four pilot watershed protection projects in 32 States were active. The White Tanks, Ariz., project had been completed previously. During the year, the structural works of improvement were completed on 22 of these pilot projects and 9 other projects were more than 90 percent completed.

During the year 32 floodwater retarding structures were completed on the 54 active pilot watersheds. This makes a total of 240 such structures with 123,222 acre-feet storage capacity. Altogether, 37 stabilizing and sediment control structures and 20 silt and debris basins were completed. This makes totals of 1,592 sediment control structures and 208 debris basins now installed on the 55 watersheds. Stream channel stabilization or improvement was done on 38 miles, bringing the total now completed to 199 miles. Roadside erosion control work was done on 54 miles and 3,077 critically eroding acres were revegetated.

Structural work was started on 90 small watersheds authorized under Public Law 566. During the year, 84 floodwater retarding structures were designed, while 23 such structures were completed. This made a total of 31 floodwater retarding structures with a flood storage capacity of 21,779 acre-feet completed at the end of the year. In addition, 29 miles of channel improvement work was completed and several smaller structures started.

Plant Technology

Much progress was made during the year in the plant technology phase of SCS activities. The progress was not confined to any particular region or section of the country, nor to any specialized field of plant technology.

In the Great Plains an improved mulch system of farming emerged as one of the most important practices to protect dryland crop fields against wind and water erosion. Farmers started to practice stubble mulching on nearly 3,000,000 acres during the year.

Alternate row seeding of grasses and legumes to assure better establishment and balanced stands became important. This technique was developed and tried at several plant materials centers in the West with promising results. Seeding in separate rows between rows of adapted grasses gave better stands of weak legume seedlings, such as birdsfoot trefoil.

In the Great Plains considerable progress was made in improved techniques for establishing permanent vegetative cover on fills, spillways, and other critical areas on watershed structures. Steep slopes, especially when facing south or west, and infertile soils on new fills were proving especially difficult to vegetate. Field planting trials, led to marked improvements, especially by: (1) Using good quality seed of adapted native grasses; (2) Seeding with a grass seed drill with depth regulators; (3) Applying non-competitive mulch such as hay or straw instead of planting a nurse crop; (4) Spiking or fastening applied mulch by use of a straight disk or similar machine; and (5) Fencing the area to keep livestock out.

During the year the useful geographic range of several perennial grasses and legumes was extended. The northward ranges of Bahiagrass, bermudagrass, smooth bromegrass, Blackwell switchgrass, Ball clover, and Rose clover were extended several hundred miles without serious winter killing, although the severe cold of the past winter caused some damage to certain plantings.

This year, for the first time, the majority of the field windbreaks planted were one and two rows. Evidence now proves that narrow belts of trees and shrubs spaced at 40 rod intervals give acceptable protection. These narrow belts cost less to establish and are easier and less costly to maintain.

In the forested coastal plains of Arkansas, interpretations of soil survey data showing the suitability of soils for growing trees were completed. Such interpretations are now being used by many landowners as guides for making their land-use decisions and for choosing those woodland conservation practices that will grow bigger and better crops of wood.

One of the outstanding accomplishments in biology has been the development of wildlife habitat on what are known as "cat clays." These are coastal soils extending from New Jersey to Texas. When these soils are drained, the sulfides oxidize to form sulfates and sulfuric acid and the acidity of the soil increases so rapidly that neither crops nor pasture will grow on them.

Techniques have been developed by Service biologists for utilizing these areas in the production of waterfowl. With proper care, browntop millet can be grown and managed for duck food so that there is little danger of producing a high acid condition in such soils. Many of the brackish water marshes, ideally suited for widgeongrass, are managed by diking and flooding with 2 feet of brackish water to create widgeongrass ponds.

The year brought substantial progress toward a better understanding of the kind of soils information needed for range conservation planning, and increased collaboration between range conservationists and soil scientists in the interpretation and presentation of such information.

Engineering

Widespread interest in improved alignment for terrace systems was noted. Farmers are becoming more and more reluctant to farm terraced land unless the spacing between terraces is made uniform so that no point rows are necessary. For good results this usually involves land forming operations prior to terracing. Farmer acceptance of this type of land preparation has been surprisingly good.

The design sections of the field engineering and watershed planning units prepared detailed plans and specifications for about 13.5 million dollars worth of construction work in 1958. To meet future demands more State design offices will be needed and probably more design work will need to be accomplished through contracts with private engineering organizations.

Service engineers developed a method for using electronic computers to compute the parameters needed in the solution of water surface profiles in natural channels. These machines are widely distributed throughout the country, which will enable the Service to make maximum use of this labor-saving procedure.

Engineers are also working on a similar approach for trapezoidal channels. This method should have significant use in the analysis of open channel flow conditions such as are encountered in floodways and irrigation and drainage channels.

New Service standards for "Buried Plastic Pipelines" were developed jointly with industry representatives and issued to the field offices. Considerable progress was made in preparing State guides for both irrigation and drainage.

The Weather Bureau is working on a storm characteristic project under a memorandum of agreement with the SCS. It also is working on a Probable Maximum Precipitation Project" which will provide rainfall-intensity frequency data for the United States west of the 105th Meridian.

The U. S. Geological Survey, in cooperation with the SCS, is working on 2 projects on the compilation of rainfall and runoff records from watersheds with areas of less than 400 square miles.

The ARS, Bureau of Reclamation, and the SCS established a work group of hydrologists at Lincoln, Neb., to undertake a 5-year study of procedures for assessing the influences of various factors on watershed water yield. They hope to develop a method for estimating quantitatively the effects of land use changes and treatment on the yield of water from small watersheds.

Great Plains Conservation Program

The Great Plains Conservation Program was officially launched in August 1957. The first contracts were signed in December 1957. During the remainder of the fiscal year, 575 farmers and ranchers signed contracts covering about 1,828,776 acres. Under these contracts, about 60,000 acres will be retired from cultivation and planted to grass during the next 3 to 5 years. Cost-sharing payments by the Government for about $394,000 were made during the year, on these contracts. Nearly 2,000 additional applications involving more than 5 million acres had been filed by June 30, 1958.

Snow Surveys

In cooperation with other Federal, State, and local agencies, and private enterprises, SCS obtained accurate snow-pack information on about 1,250 snow courses in the Western States during the winter and early spring of 1958. In addition, information obtained from British Columbia on the snow pack of the upper Columbia River watershed was made available to farmers and other interested people as a part of the spring runoff prediction.

The early spring estimates of the amount of water that would be available for irrigation not only helped irrigation farmers plan their cropping systems, but also informed all citizens of the area regarding the possibility of floods and the probable water supplies during 1958.

Emphasis was given during the year to increasing forecast accuracy from snow surveys and to providing technical data to water users in a more easily understandable form.

Conservation Needs Inventory

The national inventory of soil- and water-conservation needs is the most comprehensive factfinding job of its kind ever undertaken. When completed in 1960, we shall have the first reliable measure of the size of the conservation job remaining. This inventory should supply the basic information on which the Service and the Department can more effectively carry out all soil and water conservation objectives.

The inventory is being made, county by county and State by State, by a team of Department agencies cooperating with other interested Federal agencies and with State and local interests. The SCS is taking leadership in making the survey and assembling and analyzing the data. In addition to the inventory of land capabilities and needed conservation treatment, an inventory of small watershed project needs also is being made.

Assistance With ACP Work

Technicians of the Service continued to assist the Agricultural Conservation Program Service participants with permanent-type practices on which cost sharing was requested. Certifications for need or practicability, assistance with site selection and layout, supervision of installation, and certification of compliance with specifications were provided on farms and ranches whose operators were participating in this program. Such assistance with the permanent-type practices, as specified in the national ACP bulletin, was given on about 430,000 farms and ranches.

Other Programs

The Service provided technical assistance to about 13,000 Soil Bank participants during the year. This help included general counseling with farmers and ranchers about the Acreage Reserve and Conservation Reserve phases of the program. SCS technicians gave direct assistance to participating farmers and ranchers in selecting lands to be placed under contract and installing treatments for longtime protection.

The Service continued to advise the Farmers Home Administration on the feasibility of conservation loans and gave technical assistance on soil- and water-conservation practices for which such loans were made.

Technical aid on soil- and water-conservation measures was given to participants in the Rural Development Program that is being carried out by the Department to help low-income farmers and ranchers in 53 designated counties and trade areas.

Only one water conservation project, authorized under the Case-Wheeler Act of 1940, was in operation. That was the Eden Valley project in Wyoming. Land development is continuing on the revised schedule adopted in 1956. It is expected that this project will be completed and closed by 1962.

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REVIEWS

INTRODUCTION TO AGRICULTURAL ECONOMIC ANALYSIS. By C. E. Bishop and W. D. Toussaint. 258 pp. Illustrated. 1958. New York: John Wiley & Sons, Inc. $5.25.

THIS book provides some very practical and useful analytical tools for use in the field of agricultural economics. While the authors state that the book was written primarily for use by sophomore and junior college students it is our view that the book has possibilities for much wider use by farm managers and economists who are engaged in the field of farm and ranch planning, including the economics of conservation and marketing. Also, the book provides some very useful background information for use by physical scientists such as agronomists, animal husbandmen, and horticulturists.

In fact the book presents the essentials of economic theory, and then quite appropriately shows how to apply the economic theory in the solution of practical everyday problems of farm management.

The book contains four major economic sections. The first clearly describes the functions of our economic system and the significance of agriculture as a part of the system. The second section deals largely with the problem of making actual production decisions on the farm. Such basic economic principles as the law of diminishing returns and marginal product are clearly explained and their application illustrated through the use of actual examples.

The agricultural economist will find section 2 a very useful working tool in connection with the solution of many of the economic problems he is likely to encounter. Sections 3 and 4 largely deal with some of the overall economic forces that will influence the demand for farm products and with the broad changes in economic conditions that will face farmers over a period of time. Some attention is also given to the trends in population growth and its influence upon the long-run economic position of farmers.

The book is interestingly written, and it is well organized with a good index and many of the seemingly complex economic principles have been reduced to simple and understandable mathematical formulas that can be applied to most actual farm management problems.

—ERWIN C. FORD

CONSERVATION RESERVE.—About 232,000 applications for contracts in the 1959 Conservation Reserve of the Soil Bank were filed in the fall of 1958. The applications call for putting more than 20 million acres in the 1959 Reserve. The National goal for the 1959 sign-up was 12.5 million acres.

WATER SUPPLIES.—The whole country is becoming water conscious to a degree it never was before, not only concerning flood prevention but with respect to agricultural and other water supplies and the growing competition for available water. No longer is water thought of just as "the lifeblood of the West." It is recognized today as "the lifeblood of the Nation."

—D. A. WILLIAMS